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POWER PUSHER
OPERATION AND SERVICE MANUAL

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SAFE OPERATION

This machine should only be operated by staff, who have been trained in its use and are familiar with the controls, attachments and features.

Power Pusher is intended for pedestrian control. Riding on the Power Pusher is not permitted.

Suitable for use in well illuminated areas only.

COMMISSIONING

Prior to use for the first time the machine should be visually inspected. Should any faults be noticed the machine must be returned to the Distributor. When connecting batteries. Please take care to ensure fuses of the correct rating and type must be installed in the battery +ve lead. It is recommended that the batteries are given an initial overnight charge.

HAZARDS

Although the batteries supplied with the machine are of a “sealed for life” type there is a small possibility that acid leakage may occur if the casings have been damaged. Use of protective clothing and eye protection is recommended when handling batteries.
The energy levels that can be delivered by these batteries can cause fire.
Please take care to ensure metal objects must not be allowed to bridge the battery terminals.
Explosive hydrogen gas may be liberated. Do not allow naked lights near to batteries.

MAINTENANCE

The power pusher contains few user serviceable parts.

User servicing is limited to tyre inspection and pressure checks, drive chain tensioning / lubrication, and battery exchange.

The machine should be returned to the distributor for any major repairs.

Safety:

- Do not use this machine in explosive atmospheres.
- Ensure visibility. Use only in well-illuminated areas.
- Keep metal objects away from battery terminals
- Remove batteries if machine is placed in storage
- Use protective clothing when handling batteries
- Ensure safe practices are employed if changing attachments.

MAINTENANCE & ROUTINE CHECKS

INSPECTION OF MECHANICAL PARTS

1) DAILY :
The machine should be given a brief visual inspection. Any defects noted should be rectified prior to use.
The handlebar control assembly includes a throttle return spring. Freedom of movement and return to centre (off) position should be established prior to switching the machine on.

2) EVERY WEEK:
The “Belly switch” anti-trap function must be tested by moving the machine towards the operator and depressing the switch. The machine must move away from the operator and stop. No movement may then be possible until the machine has been re-set.
Note: this test must be performed with good clearance behind the operator.

3) PERIODIC :
Certain parts of the “drive train” are liable to wear in normal use. These are :

a. Chain sprocket keyways
b. Axle freewheel hub bolts
c. Free-wheel hub lock drive pins

These items should be examined for wear and replaced if this becomes excessive. Examination should take place at a minimum of 6 months for the sprocket keyways**, and monthly for the axle bolts and free-wheel hub sliding drive pins.

** this should take place during chain tension and lubrication work specified above. Attempt to rotate the drive sprockets observing any movement relative to the spindle.

Note: wear in the hub pin should be obvious during actuation – take curative action if wear is detected.

BATTERIES: removal, replacement and re-charging

BATTERIES SHOULD ONLY BE REPLACED BY A SIMILAR TYPE.

⚠ Standard fitment is: (2x) Sonnenschien A512 “DRYFIT” 60Ah 12V Sealed, Valve regulated GelLead Acid.

CAUTION! Each battery weighs approximately 22Kg. Use safe lifting practice.

Removal of batteries will alter the weight distribution of the Power Pusher and will affect its balance. Ensure the machine is safely chocked/packed to avoid tipping if the batteries are to be removed.

⚠ Lead Acid Batteries must be handled with care. Use protective clothing and eye protection when handling batteries.

⚠ Batteries under charge may liberate EXPLOSIVE HYDROGEN GAS.
Note: If batteries are to be charged in a dedicated charging area, or room, a **“NO SMOKING”** sign should be displayed.

Life expired batteries must be disposed of in an environmentally safe manner. If in doubt, consult your local authorities regarding safe disposal.

The Power Pusher is fitted with a GUEST dual output battery charger.
Model 2620-230 is intended for connection to a 230V AC supply.
Model 2620-B is intended for connection to a 110V AC supply.

FUSES

⚠ Fuses must only be replaced by the same type and rating.

1. (UK 220V) mains plug is fitted with a 13A fuse.
2. Battery charger output fuses are 15A.
3. DC control fuse 1.25” 3A

Note: Battery charger output fuses: In-line fuses are only fitted in the connections to battery +24V and +12V (centre link) terminals.

CHAIN ADJUSTMENT

⚠ Disconnect the batteries before commencing.

Chain adjustment is provided at the motor/gearbox; slacken the 7/16 inch (vertical) bolts retaining the motor/gearbox and move the assembly until the maximum chain displacement is ½ inch (12.7mm) at the centre of the chain run.

Re-tighten the bolts to 8.3 Kg-M (60 Ft -Lb)

(Chain tension adjustment should be checked every six months.)

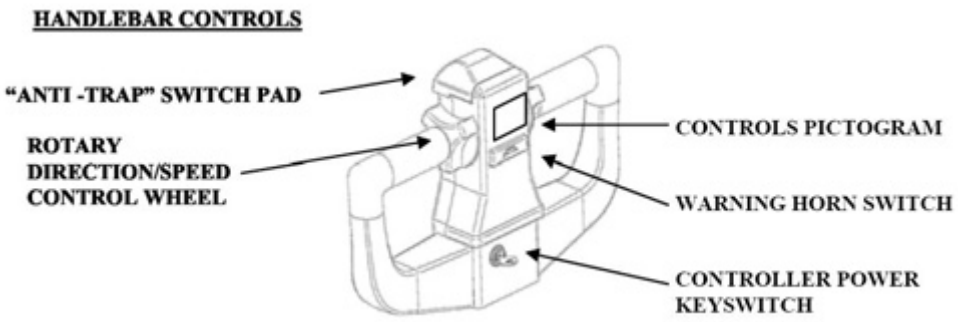
LUBRICATION

The chain should be lubricated once a year (more if usage is heavy) with SAE30 oil. **Do not over lubricate.**

CLEANING

Avoid excessive penetration of water into the handlebar control assembly and electronics.
Remove heavy soil with a soap/water solution
Do not use pressure washers.

CONTROLS AND OPERATION



MAIN DC POWER SWITCH

Controller Power Keyswitch

The key switch immediately in front of the handlebar assembly controls supply of power to the control electronics. This controller supply keyswitch must also be turned to the on position (I) before the machine will function.

⚠ REMOVE THIS KEY IF THE MACHINE IS TO BE LEFT “OUT OF SERVICE”.

Turn “off” while the machine is not being used.

ROTARY CONTROLS – SPEED & DIRECTION OF MOVEMENT

Forward and reverse movement of Power Pusher is controlled by the rotary thumbwheels positioned inboard of the handles. These are spring loaded to automatically return to the stop position.

The thumbwheels are connected internally – movement of either wheel will initiate movement.

Machine Speed is dependant on the amount of rotation.

Rotate the thumbwheel in a forward motion (away from the operator) to make Power Pusher move forwards. (away from the operator)

Reverse rotation (towards to operator) will make Power Pusher move backwards. (towards the operator)

POWER INDICATOR and Low Battery "lock-out" function

A 10 LCD "CURTIS" battery state indicator (clock) is fitted in the handlebar beam
10 Black LCD's indicate full charge. A reduced number of LCD's lit indicate progressive discharge.

Note: An optionally fitted "lock out" signal from this indicator to the control processor will prevent machine operation if the batteries are in an excessively discharged state.

This indicator should illuminate once the two switches are turned on. Power Pusher can be used while black LCD's are shown.

Note: The electronic control unit fitted to Power Pusher contains a power saving timer. If the power switch has been turned on, but the machine has not been used for 25 minutes or more the circuit will shut down. To use the machine again the key-switch must be turned OFF then ON again.
The key-switch should be turned to the "off" position if machine is "in use" but with no demand.

ANTI-CRUSHING SAFETY FEATURE: ("BELLY SWITCH")

A switch pad is fitted in the handlebar assembly facing the operator.
Should the machine be reversing towards the operator, gentle depression of this switch will immediately cause Power Pusher to switch to a forward motion, and stop when the (switch) pressure is removed.

This is to prevent the operator being accidentally crushed by Power Pusher and the load while reversing.

Note: The machine will stop permanently.
It will be necessary to turn the power switch OFF and ON again before the machine will function normally, if this feature has been activated.

ANTI - RUNAWAY FEATURE

The controller fitted to Power Pusher is able to detect movement due to the "Back EMF" created by the dc motor. Should the voltage increase to a certain level the controller will apply an opposite voltage to stop the movement.

This occurs even when the power switch is OFF (or no batteries are fitted)

FREE WHEEL HUBS

Power Pusher can be supplied with **optional free-wheel hubs** to ease manual movement.
In order to move power pusher manually i.e. without power, (for other than short distances) the drive couplings (free-wheel hub locks) on the wheels can be isolated.

This is achieved by pulling the spring-loaded pins outwards and allowing them to rest in the disconnected position.

Power Pusher weighs **160Kg** -without attachments. A starting effort of 2.6Kg force is required to move this machine in its basic form.
Machines fitted with large attachments WILL require more force. It must be remembered that more effort is required when pushing up gradients. Ensure that assistance is used where necessary.

Free wheel Hub Lock – engaged position
(shown without optional wheel guards for clarity)

⚠ **SAFETY !** Hub lock must be re-instated after manual movement – otherwise “anti-runaway” will be permanently disabled

⚠ Under no circumstances should the machine be allowed to move down falling gradients, or be off-loaded using ramps, with the drives disconnected, as an uncontrollable "run away" may occur.

DO NOT LEAVE THE MACHINE PARKED WITH DRIVES DISCONNECTED

FAULTS

In the event of the power indicator not illuminating when the batteries are known to be in a “good” condition, check the battery and controller supply fuses.

For any other fault condition consult the supplier.

BATTERY CHARGING

⚠Power Pusher is fitted with an EU Compliant GUEST model 2630-230 dual output battery charger intended for 230V AC or GUEST model 2630-B dual output battery charger intended for 110V AC; 50/60Hz operation. Charging this unit in any manner other than by the charger provided may result in serious damage.

For the UK market, the GUEST model 2620-230 charger is supplied fitted with either a UK 3 pin (BS1368A) plug which has a 13 Amp fuse installed or, the GUEST 2620-B charger is supplied fitted with a yellow industrial 16Amp 2P + E PE plug (IP44). Replace fuse or damaged plug only with the same type and rating.

(In other countries local electrical regulations apply.)

Batteries supplied with Power Pusher are of a heavy-duty sealed valve regulated type. Life and performance depends upon keeping them charged at all times. They should not be stored in a discharged condition.

CHARGER

BATTERY CHARGER OUTPUTS
GUEST
INPUT: 230 VAC, 50/60Hz @ 2.0 Amps Maximum
OUTPUT: Dual 12 VDC @ 20 Amps Total
TROLLING/SHIP SERV. BATTERY #1
CHARGE PRO
TROLLING/SHIP SERV. BATTERY #2
MODEL 2620-230

The above photograph shows the Guest 2620-230 as installed in the Power Pusher
It is located under the hinged lid of the battery compartment. In-line 15A fuses are fitted.
Only use replacements of the same type and rating.

⚠DO NOT ATTEMPT TO MOVE POWER PUSHER WHILST “ON-CHARGE”
USE OF AN EARTH FAULT PROTECTED MAINS SUPPLY IS REQUIRED.
REPLACE FUSES ONLY WITH THE SAME TYPE AND RATING

LED indicators are provided for both 12V batteries, which are connected in series to supply the Power Pusher. These batteries are individually connected to the two charger outputs.

When the RED LED is illuminated the battery is discharged. The charger is recharging at the “Bulk” charging rate of 10A Voltage is between 11.8 and 14 volts

When both LED's are illuminated the charger is recharging at an absorption rate between 3 and 6 amperes. Voltage will be approximately 14V.
In either case if the LED's remains ON for more than 48Hrs refer to the troubleshooting section.

With only the green LED illuminated the battery has reached almost full charge and the charger is delivering “top-up” at less than 3 Amperes.

The charger circuitry is designed to prevent overcharging.

CHARGER TROUBLESHOOTING

Symptom / possible cause	Solution
1) LEDs do not illuminate	
No mains supply	Check supply and mains fuse
Charger fault	Return charger to Supplier.
2) LEDs illuminate but batteries do not charge.	
Batteries may be defective	Replace if necessary
Loose connections	Check and tighten
Charger output shut down due to overload or short circuit	Eradicate cause & replace blown fuses, with same type and rating
3) Charging time excessive in hot weather	
Charger has shut down due to overheating	Move machine to a cooler environment with better ventilation
4) Red LED permanently ON (48Hrs+)	
Dead short or overload	
Remove mains and then isolate the batteries from the charger. Green LED should illuminate when Mains is restored. If not the charger may be defective.	Return Charger to supplier. Change battery. Do not attempt to charge additional or larger batteries.
5) Green LED permanently ON (48Hrs+)	
Fuse(s) blown	If fuses and connections are sound, return charger to supplier.
Faulty connection	If fuses and connections are sound, return charger to supplier.
6) Red & Green LEDs permanently ON (48Hrs+)	
Battery damaged or unable to reach full charge. Poor electrolyte or cell damage.	Check and replace battery

INSTRUCTIONS FOR ACCESS TO MOTOR AND DRIVE

1. Open the main body lid and secure safely in the open position (or remove it)
2. Disconnect and remove all cables from the batteries, first noting their positions and fuses to ensure correct re-assembly.
3. **CAUTION**!
   Each battery weighs approximately 22Kg. Use safe lifting practices.
   Removal of batteries will alter the weight distribution of the Power Pusher and will affect its balance.
   Ensure the machine is safely chocked / packed to avoid tipping if the batteries are to be removed.
4. Remove the battery restraint (7) and remove both batteries. Note: safe handling of batteries
5. Un-fasten and remove the charger mounting plate (8) along with the charger.
6. Un-bolt and remove the battery divider plate (6)
7. Un-bolt and remove the battery support plate (5)
   The Motor gearbox and its mounting frame will now be visible.
   Chain adjustment is provided at the motor/gearbox;
8. Slacken the 7/16 inch (vertical) bolts retaining the motor/gearbox mounting (24) and move the assembly until the maximum chain displacement is 12.7mm (½ inch) at the centre of the chain runs. Avoid un-equal chain tension.
9. Re-tighten the mounting retaining bolts to 8.3 Kg/Metres (60 Ft/Pounds)
10. Re-assemble parts in the reverse order to above ensuring all bolts /screws are tightened correctly with all washers re-fitted.
11. Re-fit the batteries ensuring the correct terminal/wire relationship. Do not allow tools to bridge the battery terminals.

NOTE: If the drive chains are badly worn contact the supplier for replacements. Drive chains must be replaced as matched pairs.

PARTS LIST REFERRING TO EXPLODED

1	401-247	Body, Main – Power Pusher
2	401-256	Handle, Welded Power Pusher
3	403-509	Handle Plate, Bottom
4	403-510	Handle Plate, Top
5	401-249	Plate, Battery Support
6	401-248	Plate, Battery Divider
7	403-483	Brace, Battery
8	500-106	Plate, Charger Mount Plate
9	401-347	Cover, Main Power Pusher
10	600-001	Handset Assembly
11	403-870	Controller, Transaxle
12	600-002	Battery Indicator
14	403-474	Housing, Main Axle
15	403-472	Axle, Main
16	304-054	Drive Chain, #40 w/Link
17	403-476	Sprocket, Main Axle
18	315-039	Bearing, Axle
19	403-514	Spacer, Collar for Axle
20	403-475	Washer, Axle Spacer
21	316-010	Wheel, Rim with Tyre
22	316-027	Free Wheel Hub Lock
23	310-081	Key, Main Axle ¼” x 2 ½”
24	500-302	Bracket, Transaxle Mounting
25	500-202	Transaxle Assembly
26	500-218	Bearing, Mounting Transaxle
27	310-075	Circlip, Transaxle
28	303-060	Sprocket, Transaxle
29	310-076	Key Transaxle, Woodruff
30	403-492	Spacer, Sprocket
31	315-040	Bearing, Differential
32	403-508	Bracket, Bearing Differential
34	600-004	Wheel Guard
35		Ratings Plate
B		Bolt, SAE, 7/16” x ¾”
W		Washer, 7/16”
N		Nut, 7/16”